Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies	)	ET Docket No. 03-108
	)	
Authorization and Use of Software Defined Radios	)	ET Docket No. 00-47

To: The Commission

REPLY COMMENTS
OF NEXTEL PARTNERS, INC.

Nextel Partners, Inc. ("Nextel Partners"), by its attorneys, hereby submits its Reply Comments in response to comments filed in the above-captioned proceeding.[1] Nextel Partners believes that market forces, not regulation, should govern the introduction of cognitive radio ("CR") and software defined radio ("SDR") devices and decisions about sharing licensed spectrum. Licensees should not be forced to accept underlayment of unlicensed, opportunistic devices that will degrade the operation of licensed systems and increase the potential for harmful interference. Nextel Partners also urges the Commission to proceed very cautiously with rule changes that would enable the proliferation of higher-powered devices for use in rural areas. Finally, to the extent that CR and SDR devices are employed by entities other than licensed communications providers, they should be restricted to certain bands, and significant protections should be incorporated to discourage "rogue operation" that could disrupt not only commercial

[1] *In the Matter of Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies; Authorization and Use of Software Defined Radios*, Notice of Proposed Rulemaking and Order, ET Docket Nos. 03-108 and 00-47 (released December 30, 2003) ("*NPRM*"), 69 Fed. Reg. 7397 (February 17, 2004) (initial comments due on or before May 3, 2004).

wireless operations, but also threaten the viability of Public Safety and other "critical mission" communications.

DISCUSSION

A. Forced Sharing of Licensed Spectrum Erroneously Substitutes Regulation for Marketplace Forces

Nextel Partners concurs with other commenters in this proceeding that the Commission should not attempt to utilize technologies such as CR and SDR devices to compel sharing of licensed frequencies with unlicensed third party entities based on the assumption that this will increase the efficiency of spectrum utilization.[2] Secondary markets, not regulation, should determine when and if sharing takes place.[3] Licensees of spectrum, and not regulators, are in the best position, and have the best incentive, to increase efficient use of spectrum where it is cost-justified. The government should not overrule the marketplace.[4]

As Nextel Partners pointed out in its May 3, 2004 Comments in this proceeding, the underlayment of opportunistic devices within the service territory of a spectrum licensee can have the effect of degrading the licensee's network by raising the interference floor, resulting in lost coverage.[5] There are clear economic harms to such an approach, but the offsetting benefits are not immediately apparent.[6] Particularly in the

---

[2] *See, e.g.,* Verizon Comments at 2 *et seq.*; Cingular Comments at 2; Wireless Communications Association International ("WCAI") Comments at 4.

[3] *See* WCAI Comments at 11.

[4] *See* Thomas Hazlett Comments at 3-4.

[5] *See* Nextel Partners Comments at 5-6.

[6] *See, e.g,* Verizon Comments at 6-7 (CMRS systems are very sensitive to external interference. Forced sharing ignores economic principles – there is no proof that the economic value increase of allowing technologies like WLANs or WISPs to use licensed spectrum will offset the damage to the licensees.).

case of CMRS carriers, which make very intensive use of their spectrum, and extract significant economic value from it,[7] there is no sufficient economic or policy justification for adopting initiatives of questionable value to the public that may hamper a licensee's network management.[8] As pointed out by Nokia, "[t]echnology alone cannot be a panacea for good spectrum management policy."[9] Without complete control over the RF environment in their licensed spectrum, licensees could be reluctant to bear the costs of optimizing their networks for efficient spectrum usage.[10]

Nextel Partners agrees with several commenters that, due to the relative immaturity of the technology,[11] there is a significant potential for erroneous access to licensed spectrum that appears to the device to be "unused," but in fact is in operation.[12] In these circumstances, authorizing unlicensed, opportunistic CR and SDR devices to

---

[7] *See* Verizon Comments at 7-8 (CMRS licensees already create more value per MHz of spectrum than other competing services. CMRS licensees serve 160 million customers on approximately 190 MHz of spectrum. Licensees spend $20 billion annually on infrastructure and billions more on handsets and service. Estimates are that CMRS licensees have created $900 billion in consumer benefits.)

[8] *See, e.g.,* Motorola Comments at 5-6 (CR implementation could have many harmful effects on various radio operations, so it is essential that CR not serve as a replacement for, but rather an element within, an appropriate spectrum management regime).

[9] *See* Nokia Comments at 3.

[10] *See* Cingular Comments at 4.

[11] *See id.* at 7-9; Motorola Comments at 1; Nokia Comments at 2.

[12] *See* Motorola Comments at 9-13 (Inaccurate detection and assessment of radio activity will cause primary users interference. This situation is compounded in non-continuous use situations, when the CR device cannot predict when the primary user activity will be initiated or resume on a given channel. This would be the case for packet or TDMA transmissions where new slots are assigned in unpredictable ways. The consequence of non-voluntary third parties lingering on a spectrum resource when the primary user needs it could be significant and should not be casually dismissed).

share spectrum with licensed operations such as CMRS networks is a recipe for disaster.[13] As observed by Cingular,

> A cellular or PCS licensee needs to control how and when spectrum is used in its licensed area. Otherwise, devices not under the licensee's direct or indirect control – "rogue" devices – have the potential to cause problems. Their interference (whether or not it reaches the level deemed "harmful") will reduce the network's efficiency by degrading quality, reducing capacity, and diminishing coverage . . . the cost of reengineering cellular and PCS networks to accommodate even a small increase in the interference and noise floor due to the presence of opportunistic unlicensed devices would be massive.[14]

Finally, as pointed out by Access Spectrum, allowing unlicensed users to access licensed spectrum gives them an undue competitive advantage, since, unlike the licensed user, they do not have to pay for it.[15] As new and innovative services are demanded and developed, the spectrum licensee, having acquired the relevant spectrum at considerable cost, should be entitled to implement the new services either directly or by means of a secondary market arrangement with a third party provider rather than having to tolerate the presence of unlicensed users that consume the scarce resource for free.[16]

---

[13] *See* Motorola Comments at 9 (Mobile services present the biggest technical challenge to CR devices, since mobility makes it impossible for present-generation CR devices to accurately predict the interference dynamics in a given environment.)

[14] Cingular Comments at 6.

[15] Access Spectrum Comments at 4.

[16] Nextel Partners disagrees with the Comments of the Electronic Frontier Foundation and The Technology Companies that unlicensed users should have free reign to use licensed spectrum on a non-interference basis, and that the Commission should only concern itself with enforcement of interference complaints. *See* Electronic Frontier Foundation Comments at 7-10; The Technology Companies Comments at 3. There is insufficient proof that unlicensed, opportunistic devices could operate in licensed spectrum without interference, and without availing themselves of access opportunities that essentially foreclose the sound management and expansion of the licensed system, at the expense of the licensee. Any operations on licensed spectrum by unlicensed, opportunistic CR/SDR devices must be authorized by, and under the control of, the licensee.

Accordingly, instead of compelling licensees to engage in frequency sharing with unlicensed, opportunistic devices, Nextel Partners concurs with CTIA that the Commission should turn its attention to encouraging the development of secondary markets in spectrum.[17]

B. The Commission Should Proceed with Caution in its Introduction of Higher-Powered Devices in Rural Areas

Nextel Partners indicated in its initial comments its opposition to the use of higher power levels for unlicensed devices in rural areas if there is a possibility for interference to licensed CMRS operations.[18] Based on the filings by other commenters in this proceeding, it is evident that the Commission's proposal to authorize higher power levels for Part 15 devices in rural areas is fraught with both technical and practical problems, and it should not be implemented at this time.

1. The definition of "rural areas" and the likelihood of proliferation beyond them

As an initial matter, it is not obvious how the Commission should designate an area as "rural" or determine that there is less intense spectrum use within certain geographical boundaries.[19] The Telecommunications Industry Association ("TIA") points out that the definition of "rural" for purposes of deploying higher powered Part 15 unlicensed devices is problematic, due to shifting population trends and other issues that make it a moving target.[20] But even more troublesome is the frank assessment of several commenters that it would be difficult or impossible to restrict high-powered unlicensed

[17] *See* CTIA Comments at 2.

[18] *See* Nextel Partners Comments at 7-8.

[19] *See* Society of Broadcast Engineers ("SBE") Comments at 2-3.

[20] *See* TIA Comments at 5.

devices only to "rural areas" or areas of less intense spectrum use.[21] Once these high-powered devices are designed, manufactured and sold, they will inevitably find their way into all areas of intense spectrum use, including non-rural areas, where they will conflict with other spectrum users.[22]

2. The potential for harmful interference

Apart from the obvious difficulties in controlling the spread of high-power unlicensed devices beyond rural areas, Nextel Partners agrees with several commenters in the proceeding that higher-powered operations of these devices carries with it the potential for harmful interference to CMRS carriers and other licensed users.[23] As pointed out by CTIA, a six-fold increase in power levels also entails a six-fold increase in out-of-band emissions that can cause lost coverage by CMRS carriers.[24] TIA notes that this is particularly true in the case of power increases proposed for the 900 MHz and 2.4 GHz bands,[25] and the problem is compounded if high power unlicensed devices are deployed ubiquitously.[26] As pointed out by the New York State Office for Technology ("NYOT"), increasing the power level of widely-distributed Part 15 devices runs the risk of diminishing spectrum access opportunities because of increased interference, and

---

[21] *See* SBE Comments at 2; Wireless Broadband Operators Coalition ("WBOC") at 12; The American Radio Relay League ("AARL") Comments at 13.

[22] *See, e.g.,* AARL Comments at 13-14; SBE Comments at 2.

[23] *See, e.g.,* Intel Comments at 4; CTIA Comments at 8-9; Nokia Comments at 3; TIA Comments at 4-5; Ericsson Comments at 15-17.

[24] *See* CTIA Comments at 9.

[25] *See* TIA Comments at 5. CTIA observes that higher-powered unlicensed operations in the 902-908 MHz band is of direct concern to CMRS carriers in the 800 MHz band due to the significant increase in out-of-band emissions that can cause interference and system degradation. *See* CTIA Comments at 9.

[26] *See* TIA Comments at 5.

makes it virtually impossible to identify the source of interference.[27] For these reasons, Nextel Partners opposes the use of unlicensed devices at higher power levels in rural areas.

Despite these difficulties, some commenters nonetheless favor allowing higher-powered unlicensed devices to operate in all areas, without restriction to rural areas or areas of less-intense spectrum use.[28] At least one commenter favored even higher power levels for Part 15 devices.[29] Such suggestions are at best premature, however. Even if some of the practical difficulties can be satisfactorily addressed (such as the definition of "rural area" in this context and the difficulty of preventing widespread proliferation, use in unauthorized locations and harmful interference), Nextel Partners agrees with TIA that more testing is needed before power levels of unlicensed devices operating in rural areas may safely be increased.[30]

C. Introduction of Unlicensed CR and SDR Devices Should be Restricted to Specified Bands, and Protections Should be Included to Prevent "Rogue Operations"

Although Nextel Partners believes that CR and SDR devices have great possibilities when used by spectrum licensees to increase the efficiencies of their networks, and possibly in secondary market leasing schemes, they should not be used on

[27] *See* NYOT Comments at 11-12. *See also* Motorola Comments at 9 ("In addition to implementation challenges, there are significant concerns about being able to take enforcement measures against devices deployed on an unlicensed basis. Once an interference problem occurs, it will be difficult or impossible to locate the unlicensed device or to remove a large number of devices once they are deployed.")

[28] *See, e.g.,* Dell Comments at 2.

[29] *See* Alvarion Comments at 6.

[30] *See* TIA Comments at 5 and 10.

an unlicensed basis except in specified bands, so as to avoid conflicts.[31] As noted above, Nextel Partners is opposed to the underlayment of CR and SDR devices on an unlicensed basis in or near CMRS frequencies. In addition, Nextel Partners agrees with several commenters that because the technology represented by CR and SDR devices is insufficiently mature, they should also not be employed in the public safety context, where communications are mission critical.[32]

The "frequency agility and remote programmability of the operating characteristics of some types of SDR devices creates additional practical and policy difficulties due to the possibility of "rogue" operations in spectrum other than bands that are authorized, or at power levels or employing operational modes, that are incompatible with licensed uses. This danger is particularly acute in the public safety context, where the difference between completing a communication on a timely basis and failing to do so could have life or death implications.[33] For this reason, the Commission should ensure that use and deployment of unlicensed CR and/or SDR devices is sufficiently controlled to make such "rogue" operation unlikely.[34]

---

[31] *See* IEEE-USA Comments at 3 (CR testing should occur in spectrum that has a relatively low percentage of actual usage by authorized users).

[32] *See*, *e.g.,* Ericsson Comments at 8-9; APCO Comments at 4-5; ITA Comments at 1, 4. *See also* Motorola Comments at 10 (CR cannot be used in the public safety environment where the uncertainty of implementing the frequency-sensing component of CR is exacerbated due to the mission-critical characteristics of public safety use).

[33] *See* ITA Comments at 4-6. The National Public Safety Telecommunications Counsel ("NPSTC") states an additional concern that "smart" radios can be used to "hack" a system or spectrum, allowing large numbers of radios to be modified simultaneously, resulting in widespread disruption to other services. For example, a virus could be introduced into a commercial cellular system, or public safety systems could be subjected to tampering. *See* Comments of NPSTC at 8-9.

[34] As pointed out by Cisco Systems and other commenters, location awareness for such devices may not be sufficient to avoid interference; they must also have the inherent

CONCLUSION

In view of the foregoing, Nextel Partners respectfully requests that the Commission take action consistent with the views expressed herein.

Respectfully submitted,

NEXTEL PARTNERS, INC.

Donald J. Manning, Vice President,
Secretary and General Counsel
NEXTEL PARTNERS, INC.
4500 Carillon Point
Kirkland, WA 98033
(425) 576-3660

By: /signed/
Albert J. Catalano
Matthew J. Plache
Ronald J. Jarvis
Catalano & Plache, PLLC
Washington, DC 20007
(202) 338-3200 voice
(202) 338-1700 facsimile

Its Attorneys

Dated: June 1, 2004

---

capability to cease operations if they are causing interference. *See, e.g.* Cisco Systems Comments at 10-11.